TDA7274

LOW-VOLTAGE DC MOTOR SPEED CONTROLLER

1 FEATURES

- WIDE OPERATING VOLTAGE RANGE (1.8 to 6 V)
- BUILT-IN LOW-VOLTAGE REFERENCE (0.2V)
- LINEARITY IN SPEED ADJUSTMENT
- HIGH STABILITY VS. TEMPERATURE
- LOW NUMBER OF EXTERNAL PARTS

2 DESCRIPTION

The TDA7274 is a monolithic integrated circuit DC motor speed controller intended for use in micro-cassettes, radio cassette players and other consumer equipment. It is particulary suitable for low-voltage applications.

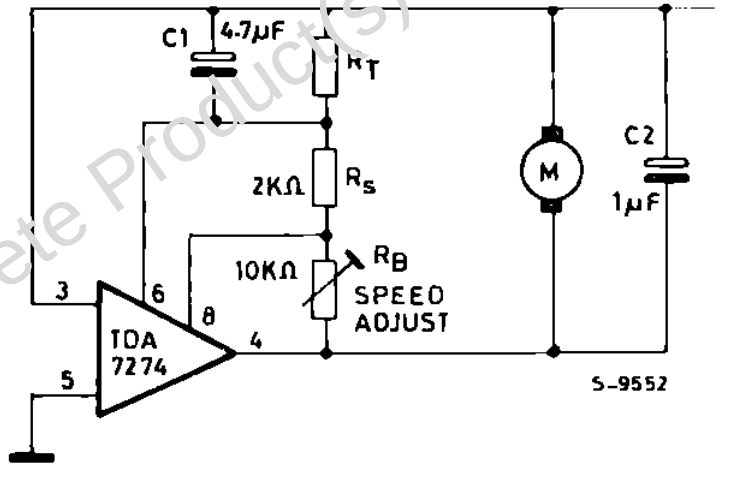
Figure 1. Package

SO8

Table 1. Order Codes

Part Number	Package
TDA7274D	SO8

Figure 2. Application Circuit



V_S = 3.0V
R_M = 4.9Ω
R_T = 220Ω
E_g = 1.65V
I_M = 100mA
$V_M = R_M I_M + E_g$ = 2.14V

Figure 3.

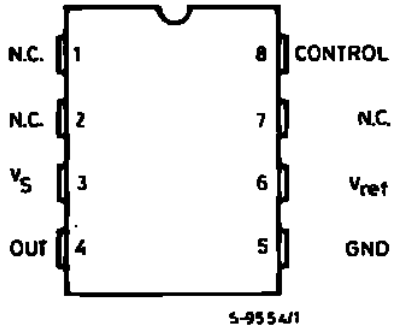


Table 2. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	6	V
I_M	Motor Current	700	mA
P_{tot}	Power Dissipation at Tamb = 25°C	1.25	W

Table 3. Thermal Data

Symbol	Parameter	Value	Unit
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	100	°C/W

Figure 4. Schematic Diagram

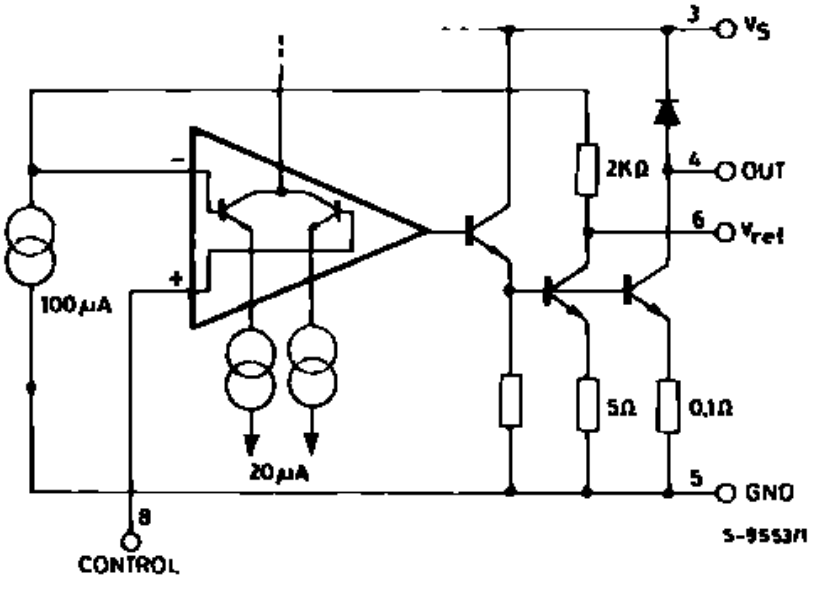


Table 4. Electrical Characteristcs (Refer to test circuit, V_S = 3V, T_{amb} = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Voltage Range		1.8		6	V
V_{ref}	Reference Voltage	I_M = 100mA	0.18	0.20	0.22	V
I_q	Quiescent Current			2.4	6.0	mA
I_d (Pin 6)	Quiescent Current			120		µA
K	Shunt Ratio	I_M = 100mA	45	50	55	–
V_{sat}	Residual Voltage	I_M = 100mA		0.13	0.3	V
$\frac{\Delta V_{ref}}{V_{ref}}/\Delta V_S$	Line Regulation	I_M = 100mA; V_S= 1.8 to 6V		0.20		%/V
$\frac{\Delta K}{k}/\Delta V_S$	Voltage Characteristic of Shut Ratio	I_M = 100m ; V_S= 1.8 to 6V		0.80		%/V
$\frac{\Delta V_{ref}}{V_{ref}}/\Delta I_M$	Load Regulation	I_M= 20 to 200mA		0.004		%/mA
$\frac{\Delta K}{k}/\Delta I_M$	Current Characteristic of Shut Ratio	I_M= 20 to 200mA		–0.03		%/mA
$\frac{\Delta V_{ref}}{V_{ref}}/\Delta T_{amb}$	Temperature Characteristic of Reference Voltage	I_M = 100mA		0.04		%/ C
$\frac{\Delta K}{K}/\Delta T_{amb}$	Temperature Characteristic of Shut Ratio	I_M = 100mA; Tamb = 20 to 60°C		0.02		%/ C

Figure 5. Test Circuit

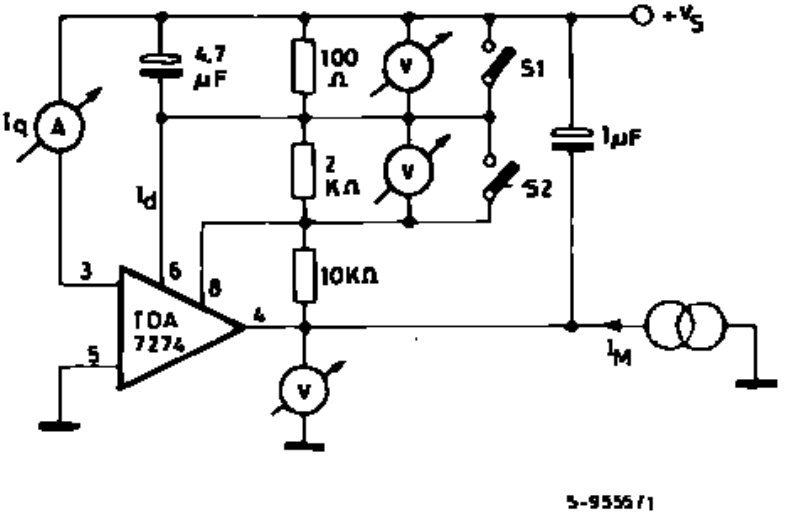


Figure 6. Quiescent Current vs. Supply Voltage.

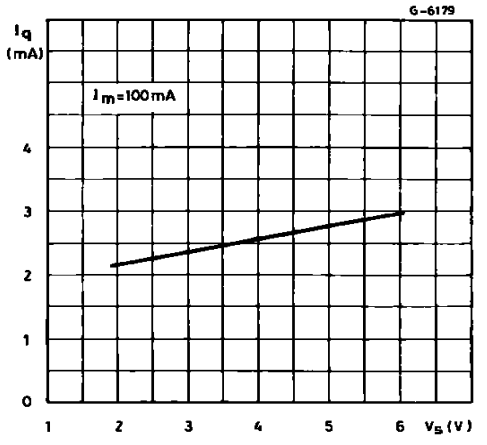


Figure 7. Reference Voltage vs. Supply Voltage.

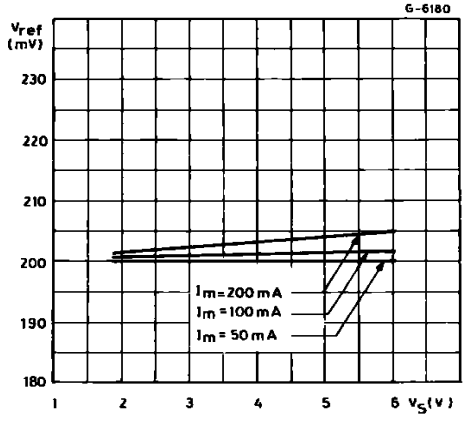


Figure 8. Shunt Ratio vs. Supply Voltage.

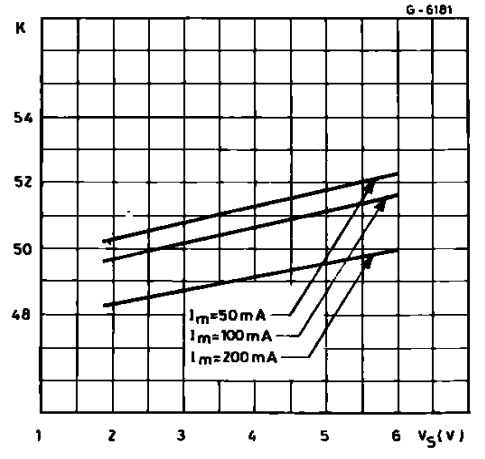


Figure 9. Reference Voltage vs. Load Current.

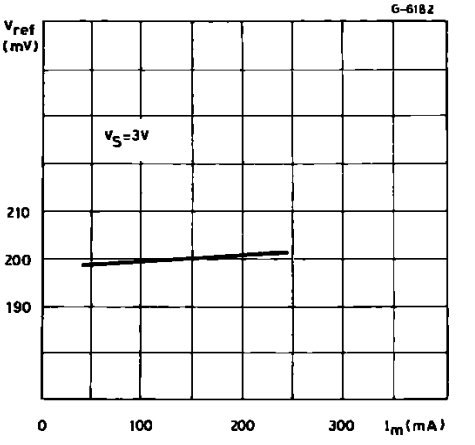


Figure 10. Shunt Ratio vs. Load Current.

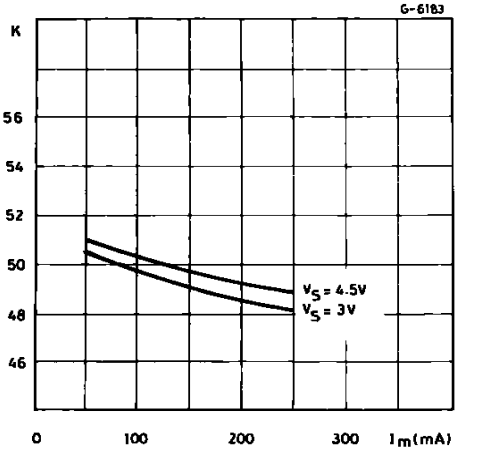


Figure 11. Minimum Supply Voltage (typical) vs. Load Current.

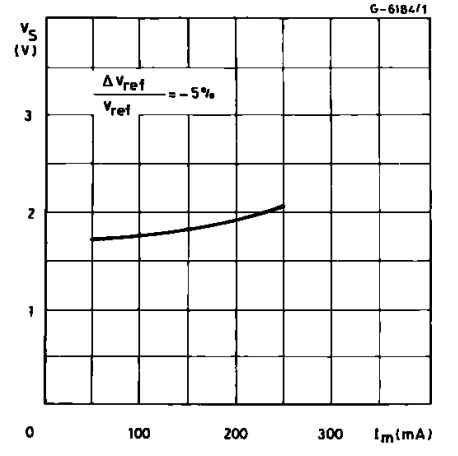


Figure 12. Saturation Voltage vs. Load Current.

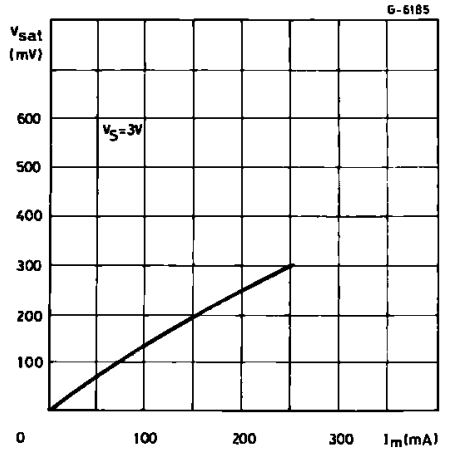


Figure 13. Quiescent Current vs. Ambient Temperature.

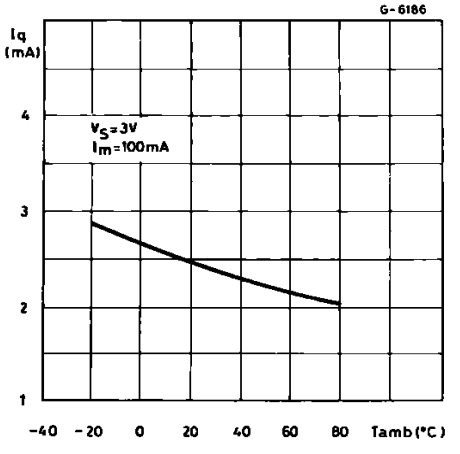


Figure 14. Reference Voltage vs. Ambient Temperature.

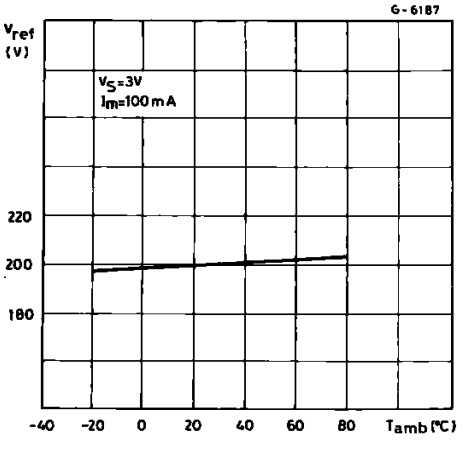


Figure 15. Application Circuit

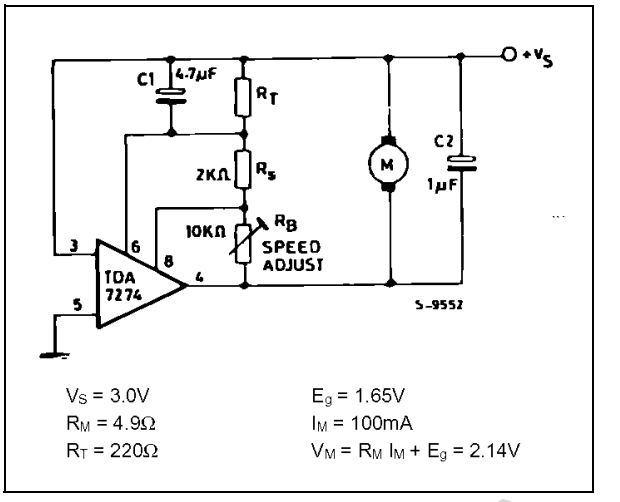


Figure 16. P. C. Board and Components layout of the Circuit of fig. 15.

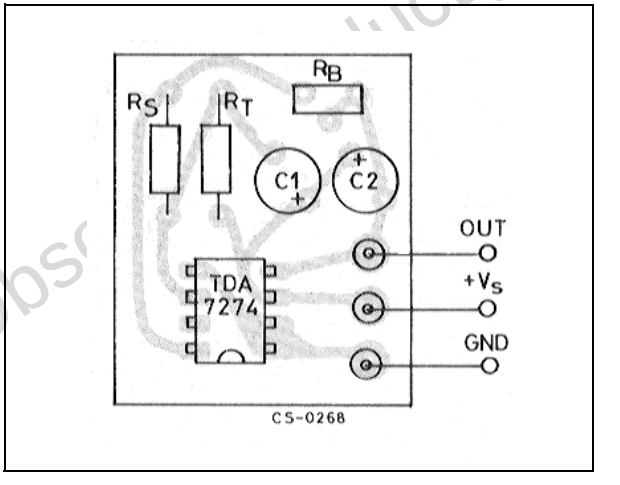


Figure 17. Speed Variations vs. Supply Voltage.

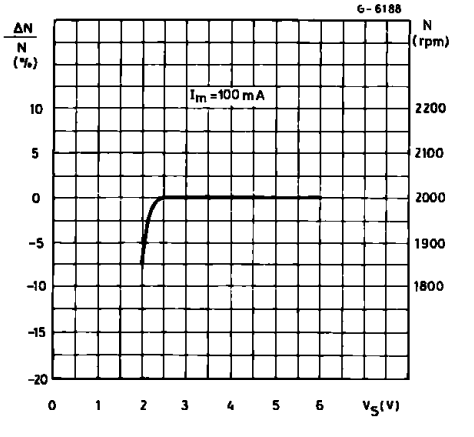


Figure 18. Speed Variations vs. Motor Current.

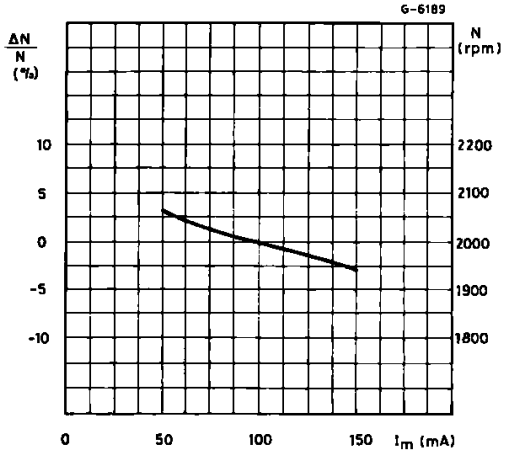
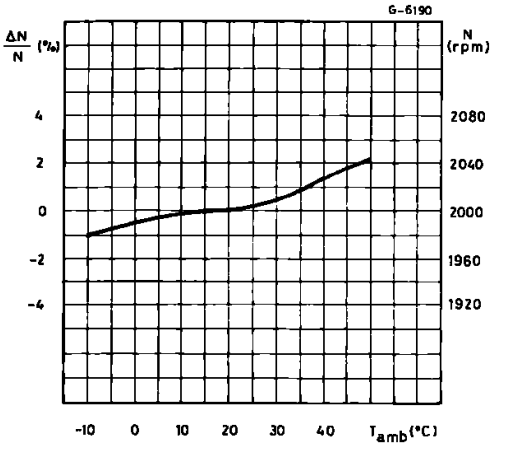
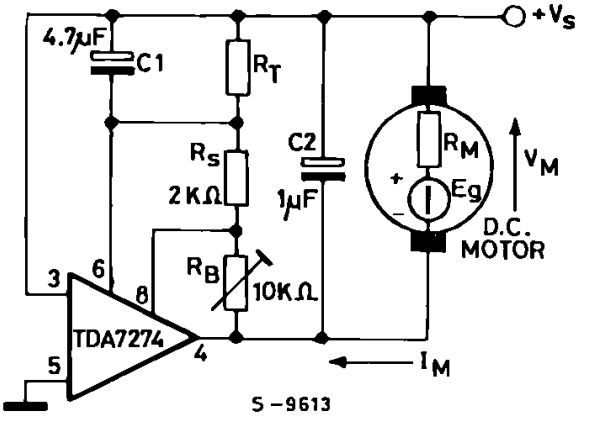


Figure 19. Speed Variations vs. Ambient Temperature.



3 APPLICATION INFORMATION

Figure 20.



I_M = Motor current at rated speed
R_M = Motor resistance
E_g = Back electromotive force
$V_M = I_M . R_M + E_g$

$$E_g = R_T I_d + I_M\left(\frac{R_T}{K} - R_M\right) + V_{ref}\left[1 + \frac{R_S}{R_S} + \frac{R_T}{R_S}\left(1 + \frac{1}{K}\right)\right]$$

R_S has to be adjusted so that the applied voltage V_M is suitable for a given motor, the speed is then linearly adjustable varing R_B.

The value of R_T is calculated so that $R_{T\,(max.)} < K_{(min.)} \cdot R_{M\,(min.)}$ If $R_{T\,(max.)} > K \cdot R_M$, instability may occur.

The values of C_1 (4.7 µF typ.) and C_2 (1 mF typ.) depend on the type of motor used. C_1 adjusts WOW and flutter of the system. C_2 suppresses motor spikes.

Figure 21. 3V Stereo Cassette Miniplayer with Motor Speed Control.

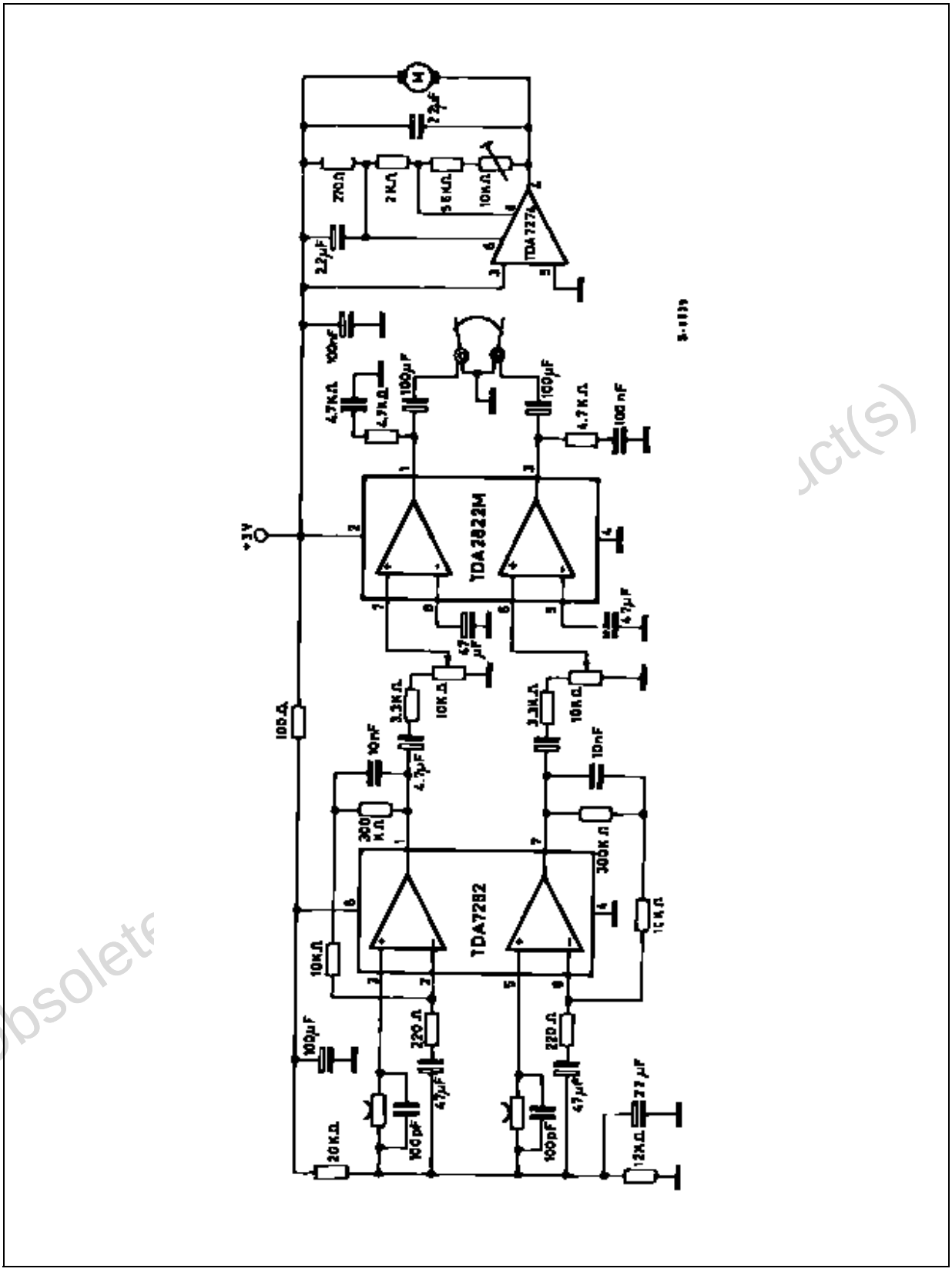
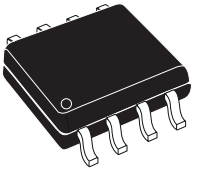


Figure 22. SO8 Mechanical Data & Package Dimensions

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.004		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D (1)	4.80		5.00	0.189		0.197
E	3.80		4.00	0.15		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	0° (min.), 8° (max.)					
ddd			0.10			0.004

Note: (1) Dimensions D does not include mold flash, protrusions or gate burrs.
Mold flash, potrusions or gate burrs shall not exceed 0.15mm (.006inch) in total (both side).

OUTLINE AND MECHANICAL DATA



SO-8

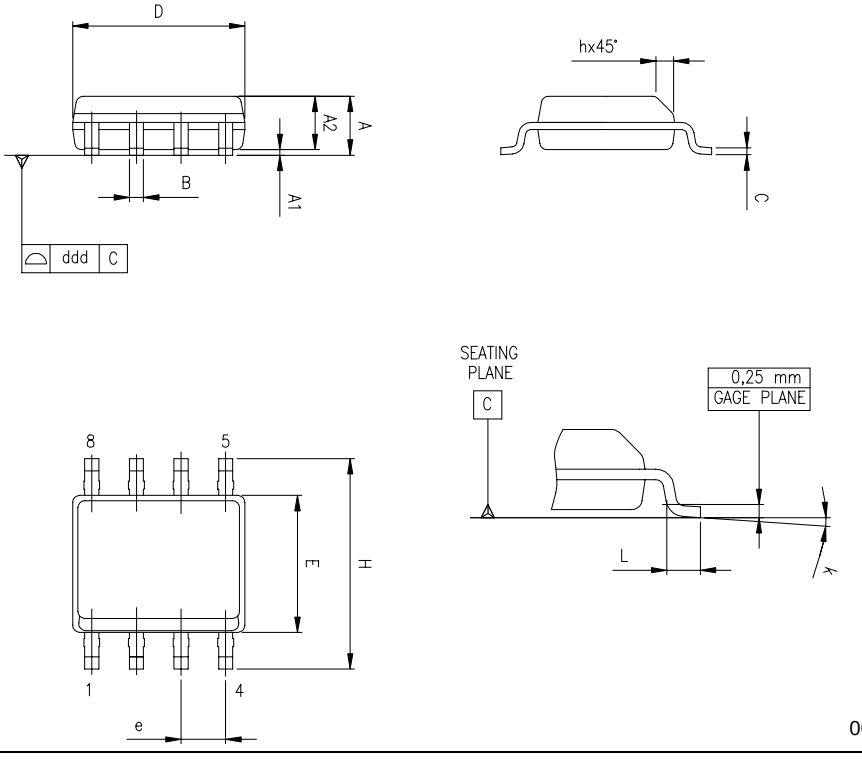


Table 5. Revision History

Date	Revision	Description of Changes
September 2003	3	First Issue EDOCS
September 2004	4	Stylesheet update